BTeV Project Management-I

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April 27, 2004

Lehman Review

Management Breakout Session

Outline of Breakout Talks

- Tuesday Breakout
  - Management Overview (Butler) 20 min
  - Long Lead Time Procurements – BTeV (Stone) 15 min
  - Long Lead Time Procurements – FNAL (Collins) 10 min
- Wednesday Breakout
  - Budget and Schedule Issues (Stanfield) 15 min
  - Cost and Schedule
    - **Cost and Schedule Methodology (Freeman) 20 min**
    - **Cost and Schedule: Future Plans (Barsotti) 20 min**
  - Project Office and Project Management Subtask (Butler) 30 min
  - Document Management and Control (Vaandering) 20 min
  - Response to Temple review (Stone) 15 min
  - Discussion

PART I

This Year in Review

- P5

"P5 supports the construction of BTeV as an important project in the world-wide quark flavor physics area. Subject to constraints within the HEP budget, we strongly recommend an earlier BTeV construction profile and enhanced C0 optics."

- Office of Science 20-Year Facilities Report

Priority: 12 Near Term – Important, Ready

BTeV

What's New: BTeV will use state-of-the-art detector technologies and the very high particle production rates at Fermilab's Tevatron to obtain the large samples of B-particles needed to make the necessary measurements.

- DOE Critical Decision 0 (CD-0)

CD-0, Approve Mission Need
for the
BTeV Project
at Fermi National Accelerator Laboratory

"We were informed the BTeV CD-0 has been approved by Ray Orbach on Feb. 17"

The Evolving Physics Case

- Emphasis now is on New Physics (NP) Beyond the Standard Model (BSM)
  - **Standard Model Constraints on CP violation and rare decays are very specific. Standard model CP violation predicts a universe with far less matter than the one we live in**
  - **New Physics scenarios almost all have additional freedom to have more CP violation that could indicate a solution to this dilemma**
- New Physics could be seen for the first time in B decays
- Or, what is now considered more likely, **as new physics is found at the Tevatron and LHC, the implications for B physics of various explanations can be worked out and looked for. B physics can help to resolve what many feel will be a complicated picture. B physics may permit one to eliminate some interpretations and to pin down the parameters of others. In particular, B physics is sensitive to new phases.**

THIS HAS IMORTANT SCHEDULE IMPLICATIONS

Implications for the Schedule

- We have competition from an LHC experiment, LHCb. Numerous comparisons between the two experiments have shown that BTeV is superior in many respects.
- LHCb is likely to have a run in 2008, which given a new detector AND a new machine, is unlikely to produce much physics.
- B physics has been around (CLEO, BELLE, BABAR, CDF, D0, ….) so it takes a while to accumulate enough data to surpass what's already been done. In 2009, LHCb is likely to have a reasonable run.
- In addition, the LHC high P_t physics should start to take off in 2009 and we want to be there to contribute to its interpretation.
- BTeV is a higher efficiency experiment, with better neutrals reconstruction, and able to record a much broader range of B physics, because of the trigger.

We are managing the project to a very aggressive schedule to make sure that we can start in late 2009 and catch up and overtake LHCb in 2010

BTeV Funding and Lab Organization

- BTeV is funded as an “MIE”, which means that it is part of the normal lab budget. It does appear in the Federal Budget but is not new money.
- The lab executes these projects through its normal Division structure. All four of the lab scientific/technical Divisions and FESS are involved in BTeV
  - Particle Physics Division (PPD) – overall responsibility for the Project Management, BTeV Project Office, BTeV R&D group will presumably become the BTeV Department
  - Computing Division (CD) – strongly in involved in trigger, data acquisition, pixel project, and software development
  - Accelerator Division (AD) – responsible for the IR, design, installation, many technical components
  - Technical Division (TD) – responsible for the magnets for the IR
  - Facility Engineering and Support Section (FESS) – C0 Outfitting

Coordination of the Divisions

- The Fermilab Deputy Director, Ken Stanfield, is providing direct oversight of BTeV
- A close working relationship between the Deputy Director, the Project Director, and the Project Manager is crucial to success.
- The formal means by which the FNAL Deputy Director provides oversight and coordination of the project and the lab's resources on it includes a Project Management Group (PMG) for BTeV. This group been meeting weekly for several months. It includes representatives of all 4 Division Heads, and of FESS, members of the Directorate, the BTeV spokesperson, members of Business Systems, and many key BTeV members.
- The role of each Division, and FESS is described in the (draft) PMP

External Institutions

- BTeV is scientific collaboration of universities and national labs in the US and Puerto Rico, Italy, Russia, China, Canada, and Belarus
- There are three national labs: Frascati, IHEP/Protvino, and Fermilab
- Scientists and technical staff from these groups will help construct the BTeV detector, help commission it, operate it and extract the physics from it
- Managing such a diverse group requires special effort, skills, and experience. These exist within Fermilab and the collaborating institutions
- This model takes maximal advantage of resources both at universities and at large laboratories
- This requires excellent communication between the experiment spokesperson, the project management, and the lab management

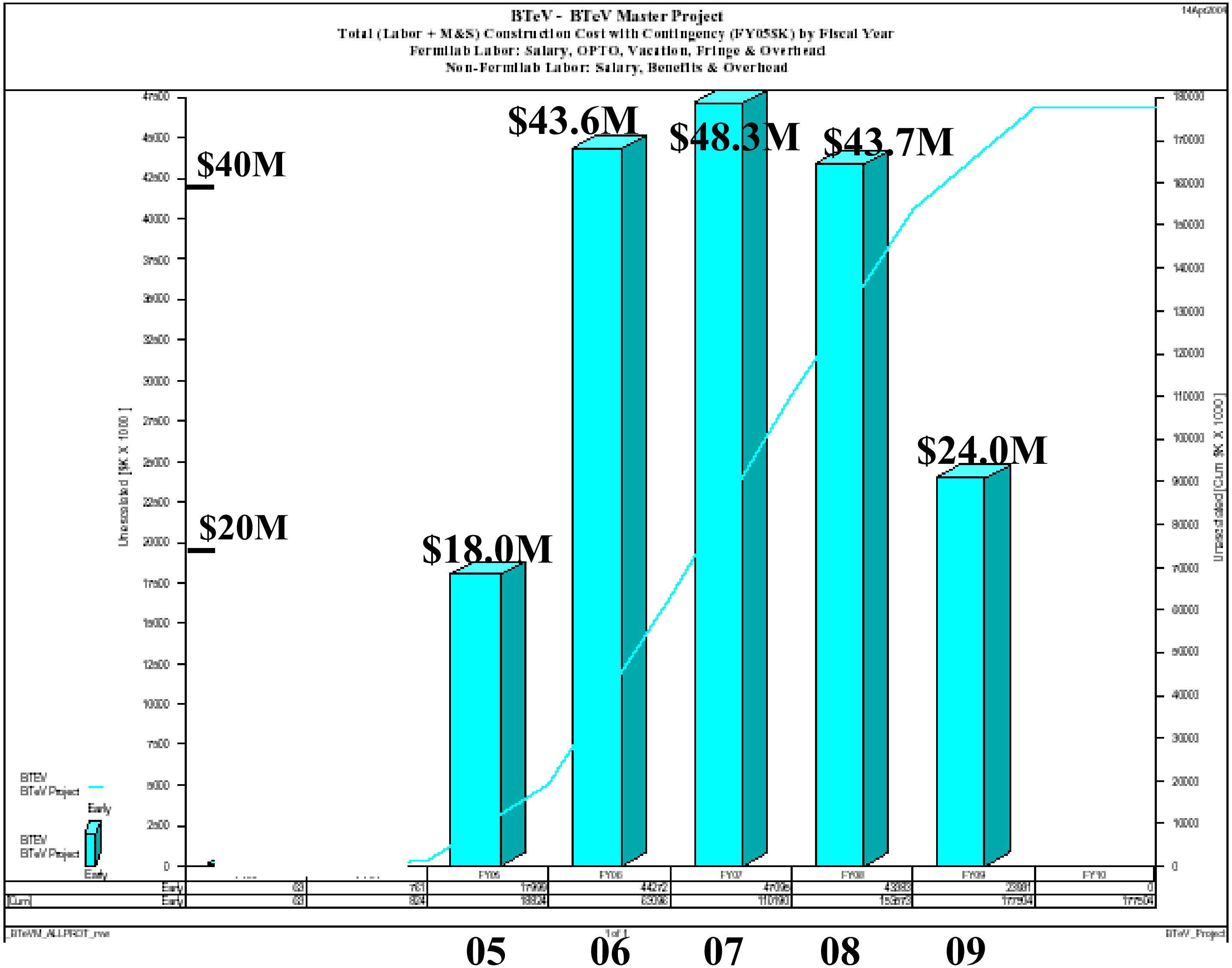
BTeV Co

Total Cost (FY05$)

Activity ID	Activity Name	Base Cost ($)	Material Contingency(%)	Labor Contingency(%)	Total FY05	Total FY06	Total FY07	Total FY08	Total FY09	Total FY05-09
1.1	Subproject 1.1	1,782,301	25	24	189,962	1,387,884	408,798	242,617	0	2,229,262
1.2	Subproject 1.2	15,455,224	42	38	1,878,446	6,279,783	7,488,061	5,243,034	760,881	21,650,205
1.3	Subproject 1.3	12,060,969	38	29	626,974	4,153,377	6,550,615	4,584,165	554,647	16,469,779
1.4	Subproject 1.4	12,255,743	35	26	493,307	3,273,761	5,284,336	5,407,909	1,857,153	16,316,466
1.5	Subproject 1.5	3,810,441	37	28	576,829	1,787,641	2,200,635	483,834	92,353	5,141,292
1.6	Subproject 1.6	9,528,012	26	32	1,387,220	4,217,436	3,228,831	2,644,198	793,915	12,271,600
1.7	Subproject 1.7	7,473,388	36	32	1,037,385	2,477,510	2,533,646	3,822,933	138,581	10,010,055
1.8	Subproject 1.8	12,049,564	33	53	637,053	2,149,757	2,650,919	4,505,693	7,102,824	17,046,246
1.9	Subproject 1.9	12,180,678	41	29	392,998	2,669,086	3,571,366	5,089,817	4,614,014	16,337,282
1.10	Subproject 1.10	6,866,456	23	61	316,564	977,322	1,886,566	3,805,638	3,297,943	10,284,034
2	Subproject 2.0	25,939,811	39	39	7,463,221	10,006,797	8,501,080	6,542,194	3,545,354	36,058,645
3	Subproject 3.0	5,980,754	21	20	1,885,738	2,807,747	2,519,673	0	0	7,213,157
4	Subproject 4.0	5,254,538	22	23	1,072,863	1,425,459	1,433,768	1,316,329	1,227,544	6,475,962
	BTeV	130,637,879	35	37	17,958,561	43,613,560	48,258,292	43,688,362	23,985,210	177,503,985

Base Cost = \$130.6M, Total Cost = \$177.5M, Contingency = 36%
Total M&S = \$99.4M, Total Labor = \$78.1M

Total Cost by FY (FY05 $)



Lab Funding Profile

	FY05	FY06	FY07	FY08	FY09	Total
Then-yr	13.1	41.2	51.2	51.7	44.9	202.1

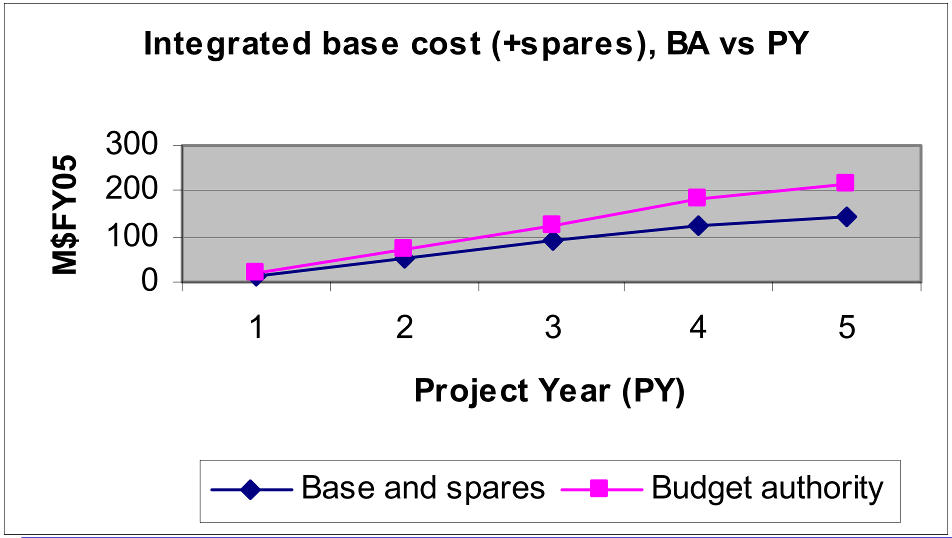
The plan we have put forward is consistent with lab funding profile guidance. The funding profile, which is "back-end" loaded, we have met by

1. **Deferring as many costs as possible, especially components such as computers whose cost fall with time**
2. **By using phased contracts**
3. **By seeking a forward funding arrangement with universities. The one with Syracuse, for $7.5M has made it through their system and is awaiting final approval. Others are being investigated**
4. **We hope eventually to get support from other funding agencies, including INFN and NSF. These are not assured but we are working with them. They have supported the R&D.**

We have an aggressive plan that uses more contingency in later years than in early years

Funding Profile (DOE Funds only)

BTeV Project Estimate						
Cost Profile - M$ AY	FY05	FY06	FY07	FY08	FY09	
Equipment Base Estimate	6.75	31.3	37.7	35	19	129.75
Contingency	2.2	10.5	14	12.8	8	47.5
Total Equipment	8.95	41.8	51.7	47.8	27	177.25
IR Spares	1.5	0	1.6	1.6	1.7	6.4
IR Spares Contingency	0.6	0	0.6	0.7	0.7	2.6
R&D	6.95	2.2	0	0	0	9.15
R&D Contingency	2.1	0.6	0	0	0	2.7
Total BTeV Costs	20.1	44.6	53.9	50.1	29.4	198.10
Availability of Funds - M$ AY						
R&D DOE	4.24	2.2	0	0	0	6.44
OP DOE	2.1	0	2.2	2.3	2.4	9
MIE DOE	6.75	39	49	49.4	42.5	186.65
Total DOE	13.09	41.2	51.2	51.7	44.9	202.09
Univ Forward Funding	7.5	0	0	0	-7.5	0
Total Availability	20.59	41.2	51.2	51.7	37.4	202.09
Integrated total BTeV Base Costs	15.2	48.7	88	124.6	145.3	
Integrated total BTeV BA	20.59	61.79	112.99	164.69	202.09	



Other funds are being sought from the INFN and US NSF. This is still at the proposal stage and is by no means certain. If they were obtained, they would help ensure BTeV could meet its schedule and insulate BTeV against budget shortfalls in DOE. The amount requested in these proposals is about $28M.

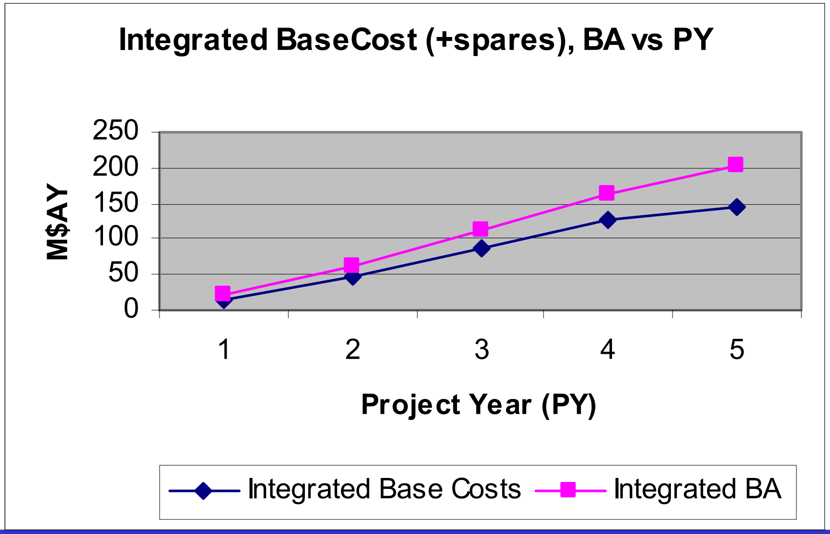
Other Funding Sources

- We have the potential to get funding from other sources
  - INFN has supported our R&D program and is interested in supporting the efforts of its investigators who are working on BTeV. The Italian institutions in BTEV are working on
    - **The Forward Silicon Microstrip Detector, where they lead the project – WBS 1.7**
    - **The central modules of the straw detector – WBS 1.6**
    - **An alignment system based on Fiber Bragg Grating**
    - **Support could offset approximately $10M of funds**
  - NSF has supported our R&D program with help on the EMCAL, RICH, Muon system, and Pixels.
    - **We have submitted a proposal to NSF to fund all or part of the BTeV RICH Detector – WBS 1.3 ($16M)**
  - **There are possible in-kind contributions from other sourcs**

These contributions, if realized, would help BTeV achieve its aggressive schedule

Funding Profile with NSF and INFN Contributions

Cost Profile - M$ AY	FY05	FY06	FY07	FY08	FY09	
Equipment Base Estimate	6.75	31.3	37.9	35.2	19.3	130.45
Contingency	2.2	10.5	13.5	12.9	8.1	47.2
Total Equipment	8.95	41.8	51.4	48.1	27.4	177.65
IR Spares	1.5	0	1.7	1.8	1.7	6.7
IR Spares Contingency	0.6	0	0.5	0.7	0.7	2.5
R&D	6.75	2.2	0	0	0	8.95
R&D Contingency	2.1	0.6	0	0	0	2.7
Total BTeV Costs	19.9	44.6	53.6	50.6	29.8	198.50
Availability of Funds - M$ AY						
R&D DOE	3.24	2.2	0	0	0	5.44
OP DOE	2.1	0	2.2	2.3	2.4	9
MIE DOE	6.15	31.8	40.3	40.15	41.4	159.8
Total DOE	11.49	34	42.5	42.45	43.8	174.24
Univ Forward Funding	7.5	0	0	0	-7.5	0
INFN	1	2.5	2.7	4.15	0.2	10.55
NSF	0.6	4.7	6	5.1	0.9	17.3
Total Anticiapted BA	20.59	41.2	51.2	51.7	37.4	202.09
Integrated Total BTeV Base Costs	15	48.5	88.1	125.1	146.1	
Integrated Total BTeV BA	20.59	61.79	112.99	164.69	202.09	



Schedule Issues

- We want to have a successful run in late 2009- early 2010
- Since BTeV is "relatively open", we could start with a subset of some of the detectors and install them in brief shutdowns.
  - **The impact of slippage is not the same for all of our subsystems**
- But to keep to our aggressive schedule we need to make sure that the IR and the pixel detector don't slip
  - The IR is crucial to getting enough luminosity to be able to do any physics
  - The pixel detector is buried in the BTeV dipole and "captured" by forward tracker elements. Much of the forward tracker cannot be installed until the pixel detector is.
- Pre-commissioning of detectors that are ready early in C0 is another part of the strategy. This requires a detailed installation plan for C0 and the coordination of assembly with construction around C0

To keep to this schedule, we need certain Long lead time procurements